

A Naval Safety Center Publication

approach

FEBRUARY 1973 THE NAVAL AVIATION SAFETY REVIEW



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Impossible

(The following narrative details an accident caused by a gross lack of knowledge of aircraft performance. Unfortunately, it is not unique. Six F-4s have been lost since 1966 as a result of overrotation and early liftoff. Less than a year ago, an F-4 was lost off the catapult when the pilot reduced power because of a landing gear malfunction and allowed the aircraft to decelerate to the point that recovery was impossible.

All these mishaps reflect directly on the pilots' knowledge of their aircraft and improper pilot technique. Many other specific accidents could be cited, but the point here is to emphasize the need for periodic, in-depth reviews of basic aerodynamics and performance characteristics of your aircraft. — Ed.)



TWO A-4C Skyhawks were cleared for a section takeoff. After liftoff, the wingman heard a strange momentary whine in his radio and found that he was unable to raise the gear handle. He informed lead and was instructed to turn downwind and land. The flight leader then continued his planned flight.

At 180 KIAS, the wingman reduced power to remain below the maximum allowable gear-down speed, started a level turn downwind at 500 feet, and switched to tower frequency. During the first 90 degrees of turn, he noticed the fuel boost pump warning flag indicating off.

Just prior to roll-out on the downwind leg, vibrations were felt which the pilot associated with the engine. Full power was added, roll-out completed, and the vibrations ceased. Downwind, the pilot climbed to 800 feet and declared an emergency. The TACAN and radar altimeter indicated OFF; both had been functional prior to takeoff.

At this point, the pilot pulled the emergency

generator handle. No change in instrument indications was noted. At the abeam position, he dropped flaps and reduced power. The approach resulted in an overshoot, and the pilot executed a waveoff. During the full-power waveoff, the pilot had the "feeling" that the aircraft was not accelerating fast enough.

The downwind turn was commenced at 300 feet and approximately 160 knots using 25 to 35 degrees angle-of-bank. Vibrations commenced during the turn and became extremely pronounced just prior to rollout. Rolling the Skyhawk level, the pilot informed the tower that he might have to eject.

As the A-4 turned off the 180, the pilot of an A-6 at the approach end warmup spot transmitted, "You look awful close abeam."

The pilot commented he was unable to "maintain altitude in the turn." Realizing he would not be able to make the left runway, he continued his approach in an attempt to land on the right (parallel) runway which was

closed for repairs. Unable to control his descent in the turn and seeing that he would also overshoot the right runway, the pilot rolled wings level in a very nose-high attitude. Passing over a hangar adjacent to the runway and just clearing the base administrative complex, he ejected at approximately 100 feet and 120 knots. The aircraft crashed at the edge of a wooded area in a slight nose-up, wings-level attitude. The pilot was not injured.

The subsequent investigation determined that the engine was capable of producing full power. The pilot was unable to remember any instrument readings which might substantiate his "feeling" that the engine was not producing maximum thrust. It was also determined that:

- The AOA (angle-of-attack) and airspeed gages were rarely used during the approach; neither was the airspeed ever cross-checked with the AOA to determine a possible malfunction of either. The AOA indexer was noticed on the first pass only and showed an on-speed and fast chevron. A slow chevron was never seen during the entire hop.

- During the first-pass waveoff, airspeed was observed to be 150 knots. The instrument was glanced at again just prior to ejection and indicated 120 knots.

- The pilot was concerned about his high gross weight (19,500 lbs) only during the decision-making process associated with the first-pass waveoff. Since his touchdown point would be a considerable distance down the runway, beyond the short field arresting gear, he felt there was a good chance of running off the end of the wet runway.

- Airframe vibration occurred in turns only and corresponded to a reduction in airspeed. The pilot was able to climb when in a wings-level attitude, but immediately upon attaining an altitude of 300 feet on the second downwind leg, he initiated his second approach turn toward the field and again experienced heavy vibrations. He never correlated increased angle-of-bank, high gross weight, and airframe buffet with a stall condition. He seemed very intent on getting the aircraft back on deck.

- During the second pass, the pilot focused his entire attention outside the cockpit, except for a glimpse at the VSI and altimeter during the initial turn off the 180-degree position and a final glance at airspeed just prior to ejection.

- When the pilot realized he would not be able to land on the right runway, he leveled his wings and slowly applied back stick in an attempt to keep the aircraft from hitting the various buildings in his path of flight.

The same flight profile was flown by an experienced aviator under near-identical conditions and provided the following information:

- The vibrations felt by the pilot were, indeed,

associated with prestall buffet.

- When in a deep prestall buffet, the aircraft would recover if full power was maintained and the wings leveled. Although the rate of recovery is initially very slow, it rapidly increases as the initial sink rate is arrested and a climb is established. This evolution takes approximately 10 to 12 seconds. The time spent wings level on the second downwind leg by the mishap aircraft was approximately 6 seconds. This was enough time to gain 250 feet of altitude, but not enough time to gain any significant increase in airspeed.

- During the simulated flight, the AOA indexer showed a slow chevron during the entire approach sequence.

Witnesses' statements indicated the mishap aircraft was in a very nose-high attitude during the entire second approach.

The aircraft is technically operating in the area of reverse command (backside of the power curve) when below 168 knots. Stall speed for the configuration is approximately 120 knots wings level, 134 knots at 30 degrees angle-of-bank, and 140 knots at 45 degrees angle-of-bank.

The whine in the headset after takeoff is normally experienced when the emergency generator comes on the line and takes the electrical load from the main generator. The landing gear retraction safety solenoid, fuel boost pump, TACAN, and radar altimeter are all inoperative when the emergency generator is providing electrical power.

When the pilot pulled the emergency generator T handle, he did not feel the generator extend or see any change in instrument indications.

Inadvertent extension of the emergency generator during takeoff roll most probably accounts for the pilot's inability to raise the gear handle. He never attempted to override the landing gear retraction safety solenoid which would have permitted him to raise the handle. (Placing the emergency generator bypass switch in the bypass position would have also brought the main generator back on the line and allowed normal landing gear retraction.)

The AOA system was not used by the pilot as a primary landing aid. Although the light bulbs in the AOA indexer system were operative and the pilot remembered seeing a fast and on-speed chevron, it is still within the realm of possibility that a failure in the slow indicating segment of the AOA existed. Not using the AOA system, especially in a high gross weight condition, indicated the pilot either lacked proper training in the system or was distracted to the point of total disregard of the system. The latter seems the most probable, since it became obvious during the inquiry that his attention

was focused on landing the aircraft as soon as possible. He made no further attempt to analyze his problems following his initial diagnosis of engine trouble. Although he was conscious of his high gross weight during the first waveoff sequence, he never thought of reducing the aircraft's weight by jettisoning the droptanks or by dumping fuel.

The pilot used a very mechanical and unorthodox landing approach which entailed flying the first half of the

approach visually, disregarding cockpit instruments until after the 90-degree position. He readily admitted that most of his approaches ended up angling. His close-abeam position and high gross weight assured an overshoot condition. This, coupled with the pilot's strong desire to land as soon as possible, caused him to use an increased angle-of-bank which placed him on the backside of the power curve. Ultimately, he allowed the aircraft to enter a regime from which recovery was impossible. ◀

Safety Center Actors Make Movie

New Aircraft Accident Investigation Film Available



In December, a new film on aircraft accident investigation was distributed to Navy film libraries. The official title is "Aircraft Accident Investigation" (MN-8270A1). It was produced through the joint efforts of the Accident Investigation Division of the Naval Safety Center and the Naval Photographic Laboratory, Washington, D.C.

The 40-minute color epic replaces the outdated black and white film on the subject produced back in the mid-fifties. Modern aircraft, equipment and up-to-date investigative techniques were employed to cover such items as reporting procedures, organization of the accident board, duties of the members, interrogation of witnesses, and security measures at the scene.

Technical advisor for the film was Mr. Terry Armentrout, the permanently assigned civilian aircraft accident investigator at NAVSAFECEN.

The movie was filmed on location at NAS Oceana. Especially deserving of a well done for services rendered are personnel from station operations, safety, and crash and salvage. Credit is also in order for MAG 26 at New River and the 2nd Marine Air Wing at Cherry Point for recovering and delivering wreckage used in the film.

In addition to supplying the technical expertise, the Safety Center recruited "actors" from its military members, civilian employees, and their dependents.

Not only is the film well worth the viewing time for officers assigned to aircraft accident boards, it should be seen by all naval aviators and aviation personnel. ▶



AIR BREAKS



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Psyched Out. During a checkflight, a *Stoof* pilot was requested by the instructor to feather the starboard engine using the emergency shutdown procedure. As the prop went into feather, the checkpilot was distracted by a radio call from Center. After completing the inflight secure checklist, the inflight restart checklist was commenced.

When the checkpilot pulled the feather button, there was no response nor any indication on the ammeter. The pilot assumed that either the switch had malfunctioned or, during the distraction with Center, the feather switch had not come out, thus pumping the oil into the crankcase. The aircraft returned to base and made an uneventful single-engine landing.

It was determined that the starboard feather-pump circuit breaker had popped. The circuit breaker was reset and the aircraft

turned up. The feathering system checked out, and the aircraft was released for flight.

The commanding officer stated in his endorsement:

"This incident is an excellent example that assumptions can be dangerous. Though the checkpilot followed emergency procedures as far as he went, he psyched himself into believing he knew the cause without proper investigation.

"All pilots at this command are again being reminded of the necessity to investigate thoroughly any and all problem areas. Had this been done, the aircraft would have returned on two engines without incident."

Brake Failure After CV Landing.

While clearing the landing area following a night approach, an A-4E pilot experienced total brake failure. The hook was dropped immediately and Primary informed simultaneously via radio. As flight

deck personnel scrambled to stop the aircraft, the pilot shut the engine down. The *Skyhawk* was brought to a stop by the physical efforts of approximately 10 flight deck personnel alerted by the 5MC.

The brake failure was caused by the aircraft touching down directly on a crossdeck pendant during a slightly harder-than-normal landing. Both wheel assemblies and all broken fittings showed gouges that were exact impressions of the pendant.

The reporting command stated:

"Considering the amount of deck movement encountered during the approach and the unexpected upward movement at the time of touchdown, the landing forces were not considered to be unusual or excessive. The fact that the pilot progressed so far up the deck before realizing the brakes had failed raised some question concerning pilot techniques in clearing the landing area. A survey of assigned pilots revealed that numerous variations of established NATOPS procedures were used to clear the landing area. As would be expected, the driving force in all techniques was the desire to clear the gear as rapidly as possible.

"The pilot in this incident used power only at the end of the rollback in anticipation of clearing the gear. Although this technique is widely used, it does not afford the pilot a final brake check prior to aircraft movement, even though a good inflight check is performed prior to landing. All pilots have been briefed to apply brakes, as required by NATOPS, after rollback and prior to any forward movement.

"The pilot's immediate corrective action coupled with the immediate reaction of flight deck personnel prevented this incident from developing into a major accident."

Cougar Shutdown . . .

inadvertent. A student naval aviator in the front cockpit with an instructor in the rear cockpit used 60 percent RPM to position his aircraft on the runway for takeoff. As the student pilot retarded the throttle, he inadvertently shut down the engine. Quickly, he attempted a relight by moving the throttle back to IDLE.

There is no battery ignition available while the aircraft is on deck. Consequently, fuel drained to the bottom of the hot engine where it ignited and was steadily fed by continued idle fuel flow. The instructor, unaware of the fire, noted RPM dropping through 28 percent and asked the student if he had shut the engine down. The student replied, "Yes sir, I guess I did!" The instructor then told him to secure all equipment, except the radio, and called the tower for an NC-5 to restart the aircraft.

The tower dispatched the duty fire truck to tow the aircraft clear.

When the duty crew arrived, they saw the fire, reported it to the tower, and used PKP to extinguish it. Meanwhile, the fuel control continued to pump fuel into the engine because the throttle was still in the idle position, with the fuel master on, *and the battery on*.

The instructor first realized his aircraft was on fire when he saw the crash crew with extinguishers and noted approximately 565° TPT. About that time, the tower notified him of the fire and scrambled the crash crew. The duty crew had extinguished the fire by the time the crash crew arrived.

Investigation failed to disclose any discrepancies in the rigging of the throttle or fuel control. It was concluded that the student pilot's failure to maintain inboard pressure on the throttle as he pulled it back to IDLE caused the engine to shut down.

The failure of the student or instructor to secure the throttle or the fuel master switch in either of their cockpits allowed the electric fuel boost pump to continue pumping fuel into the engine, *even after engine rotation had stopped*.

The fire-on-deck checklist should have been used to secure the aircraft.

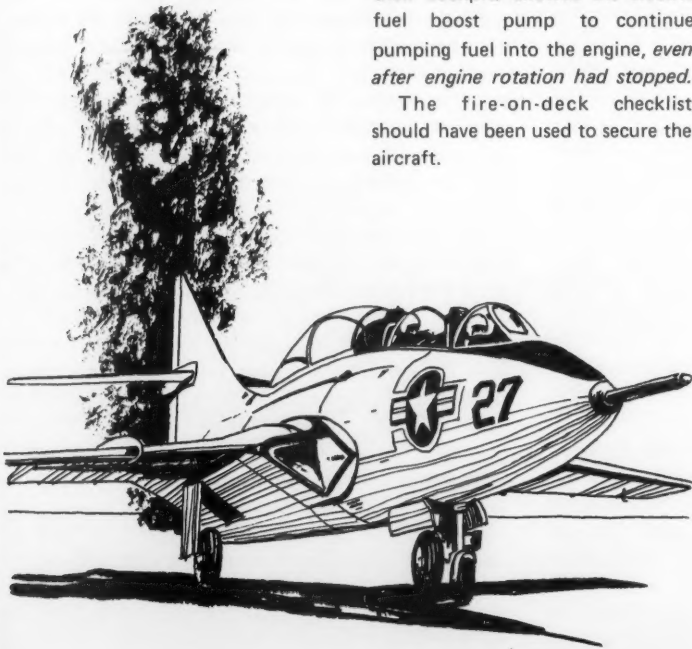
New Sonobuoy Pattern? The crew of a P-3 loaded the external SLT (sonobuoy launch tubes) for an ASW training flight. The tubes were given a routine security check, and the pilots taxied for takeoff.

Forty minutes later another P-3 taxied out, and the pilots saw an intact SLC (sonobuoy launch container) on the runway as they positioned for takeoff. The tower was notified, and a ground crew was sent out to remove the runway hazard.

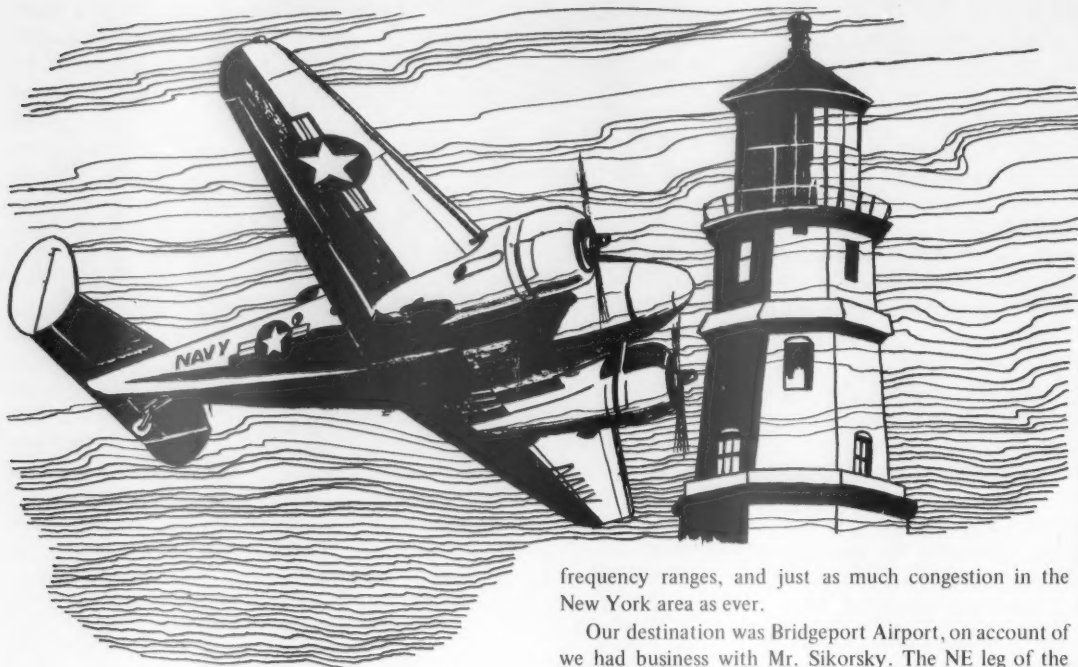
When the first P-3 crew returned, they were told what happened. An inspection disclosed no damage to the aircraft, but one tang of the obdurator mount on the SLC was bent. The aircraft apparently threw the SLC off as it made a 180-degree turn from the taxiway to line up on the duty.

Probable cause was inadequate post-loading inspection by the crew. The SLC retention system showed no discrepancies. The squadron reported that when utilizing external SLT it is imperative that crews ensure SLCs are not only properly loaded, but also properly locked in place.

Attention to details is a must! Checks of SLT, latching devices, and seating of SLC end-cap shear pins will preclude inadvertent stores release. SOP requires that the stores be loaded by the crew AWs, checked for security by another crewman (usually the ordnanceman), and spot checked by the third pilot. Additionally, base ops has been requested to check the entire runway after an aircraft with loaded, external SLTs has taken off. One further precaution has been instituted — Departure has been requested to radar vector the aircraft away from populated areas during climbout. ◀



There's no safety device for a



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By C. B. Weisiger

EXCEPT for the damages incurred and the injuries suffered, many aircraft mishap reports would be humorous. Any tendency on the part of reviewers of mishap reports to chuckle, however, is usually overcome quickly by disgust/incrudulity/anger. The seriousness of mishaps resulting in hundreds of manhours of rework or loss of time due to injuries cannot be taken lightly.

A sage once said, "There are no new accidents. They are merely the same old accidents caused by new people." The same person, or a close friend, also stated, "Aviation is not inherently dangerous, but is terribly unforgiving of human error." Whatever the philosophy, whatever the psychology, we see repetition of the same goofs over and over and over . . .

One of the absolute laws of aviation is *thou shalt not descend below MDA on an IFR approach unless the runway environment is in sight*. There are hundreds of aviators in marble country who didn't obey this and today RIP.

Let me tell you how another would-be occupant of marbleland almost made it — instead of writing this article. It was back in the days of lots of SNB/JRBs, low

frequency ranges, and just as much congestion in the New York area as ever.

Our destination was Bridgeport Airport, on account of we had business with Mr. Sikorsky. The NE leg of the range was the letdown leg, with final on the SW leg, and wind permitting, straight in on 24. I forget the actual weather that day, but it was minimums. Let's say indefinite ceiling, sky obscured, 1 mile in fog, winds calm. We received an approach clearance, very smartly executed an instrument approach with proper altitudes and voice reports, checked the low cone inbound, and were cleared to land.

We knew the airport and knew that once we were on final, there were no obstructions dead ahead, just nice, flat Long Island Sound. So I cheated. I didn't stop at 500 feet, but went on down to 100 feet expecting to pick up the runway any second. When the proper time from the low cone had come and gone and no runway appeared, I executed a missed approach and told the tower.

Instead of an immediate climbing turn, however, I made a level 180 and then began a climb. Why? I haven't the foggiest. I had never done it before, nor have I done it since. Anyway, a month later we were there again. We stopped for coffee at the airport snack bar and listened to a story, told by a lighthouse keeper, about a couple of dum-dums who almost flew through his lighthouse one day last month. His duty station was located on the SE

a Wandering Mind

tip of land adjoining the airport. Guess who he was talking about?

Well, times and airplanes have changed, but pilot error and stupid stunts have retained their frequency. Here are a few:

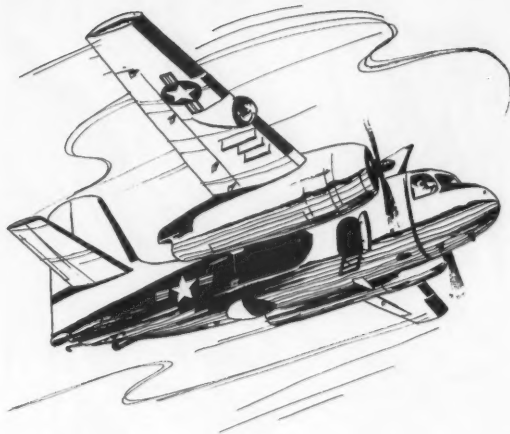
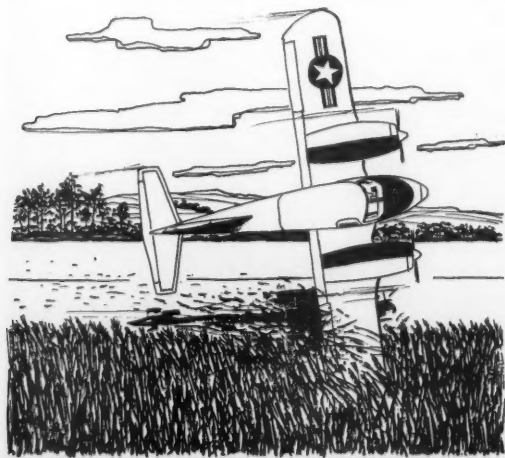
On Final

Two field-grade pilots in a trusty U-11 were shooting a PAR to a landing in VFR conditions. Winds were light and variable. They were in the traffic pattern behind a C-130 shooting touch-and-gos.

On final, the U-11 pilots noticed the C-130 ahead of them land about halfway down the 11,800-foot runway. The U-11 had just passed over the numbers 100 feet AGL when it went into an uncontrollable 90-degree, right-wing, nose-down attitude. The starboard wing went into the tops of oats growing beside the runway, but didn't contact the ground.

The *Aztec* responded to aileron control and power (rugged little rascal), and the pilots executed a waveoff. After landing, some damage to the starboard wing was discovered. Wake turbulence, a condition known to all pilots, was the culprit.

Instances of wake turbulence around airports have been known to exist for 5-10 minutes under conditions of light winds. If the wake turbulence that the U-11 pilots experienced didn't come from the C-130, it could have easily been there from a previous approach.



Let's Make One More

Two pilots on a CRT flight in a *Stoof* were shooting touch-and-gos when the tower asked if they would take a couple of passengers to Nearby AFB. They allowed as to how it would be a nice break in the monotony of 'round the maypole and agreed to provide the transportation. They landed and taxied to Ops expecting to see their passengers standing by.

After waiting several minutes, they sent their crewman in to see what was causing the delay. At that moment, the tower advised that their passengers were on the way, but wouldn't arrive for another 5-10 minutes.

The pilots decided to make one more takeoff and landing. They were cleared as requested and promptly taxied out. They took off with the main access door open and ladder extended! The tower controller was not in position to see the open door and issue a warning. The pilot in command had failed to ensure the aircraft was ready for flight.

All of the ingredients for catastrophe were present, but the door didn't tear off, the boarding ladder didn't budge, and the pilots landed safely — chagrined, but OK.

Problems In Flight

The HAC of a CH-53D took off IFR from Homeplate for Sideplate. About 40 miles out at 8000 feet, he lost his nav aids. Unable to contact Departure, he thought he was NORDO, too. Initially, he wasn't shook, but as he



rotated along, the pucker factor rose.

He next discovered his inability to transfer fuel. Now, to get to his destination, he had to transfer fuel. So there he was at 8 thou in the clag, no nav aids, no comm, and insufficient fuel to get where he was going.

Dialing in a certain number in the 7000 series on his IFF, he punched a few buttons on his UHF transceiver. Lo and behold, something worked; he contacted GCI.

About this time, he had to shake his head because he couldn't believe his eyes. His airspeed went to zero and his rate of descent showed 1500 fpm down. He was in mountainous terrain, and the very last thing he wanted to do was to fly into a peak. He hollered real quick-like, and a very understanding GCI controller handed him off to Civilian Airport.

The two pilots became very busy. The HAC lowered

his nose 5-10 degrees and increased torque to max. Momentarily, the aircraft leveled off, then increased descent to 4000 fpm down. The copilot, who meanwhile had been talking to Civilian tower, declared an emergency and asked for vectors clear of the mountains. They said a short prayer, held their breath, and watched unhappily as the altimeter unwound.

They broke out of the clouds at 4500 feet over a valley, but the HAC had control problems now. With full right stick the aircraft remained in a 5-degree left bank. As they descended, however, control response became normal, and an uneventful landing ensued.

There's nothing like a brief respite after a hairy experience. Our two aviators discovered the switches on the pressure refueling panel incorrectly set. Knowing they had encountered icing at 8 thou, they decided to check out the ice detector and anti-ice systems. They worked as advertised. Whereupon, the pilots refueled and continued their flight without problems the rest of the way.

Aw, It's OK

An instructor and his student in a TH-57 were shooting practice autorotations with power recoveries. The pilot noticed compressor stalls when the engine accelerated from flight idle to powered flight range, and his TOT was higher than normal in a hover — *but within limits*.

The first period complete, the instructor signed out the same aircraft for the next period. More autorotations were conducted, except this time TOT went beyond the red line for continuous operations. The instructor returned to base at reduced airspeed to prevent exceeding TOT limits. Inspection revealed failure of 6th stage compressor blades.

Pilot Error

In most of the examples cited, if a fatal accident had occurred, investigators would have been hard-pressed to pinpoint the cause. Actually, each one would have been simple, pilot error. Instead of possible pilot disorientation or some system failure, the causes would have been gross violations of FAR, improper aircraft handling, or violation of NATOPS.

What makes a pilot descend below MDA without the runway environment in sight; or follow a "heavy" on final in a light twin; or takeoff with a door open; or fly cross-country with an improper fuel panel set up; or fly an aircraft with known discrepancies? Several words, such as overconfidence, complacency, ignorance, or carelessness come to mind — things we can do without. ◀

INVOLVED

AN off-duty AT1 was working in the backyard of his home, about 1 mile from NAS Eastcoast, when he noticed that the starboard wheelwell door of a passing NC-121K *Super Constellation* was not fully closed. Fortunately for the pilot and crew, this observer cared enough to start a chain of events that resulted in a happy ending for all concerned.

What did he do? He knew the squadron to which the aircraft was assigned and immediately called the duty officer. The duty officer in turn called Washington Air Traffic Control and requested they contact the aircraft. After the pilot was notified, a visual inspection of the wheelwell area was made with the use of the drift sight; and because there was no immediate hazard, the pilot elected to continue on to his midwest destination.

After landing, a ground check of the starboard wheelwell area revealed that the top bolt of the wheelwell door track had sheared, thus preventing the door from fully closing upon retraction of the gear. A telephone call to Homebase gave the crew permission to effect a temporary fix.

The return flight was uneventful, and the aircraft and crew landed at NAS Eastcoast safe and sound — with only one Safety UR/Aircraft Incident Report required.

End of story? Not quite. What would have happened if the ground observer had shrugged his shoulders and decided not to become involved? This flight was originally planned for a brief passenger stop at Midwest Municipal, and the pilot did not intend to shut down the engines. If the aircraft had made this quick turnaround, taken off, and raised the landing gear without being aware of the discrepancy, the gear upon retraction would have crushed the wheelwell door, possibly damaged or ruptured hydraulic lines, and could have jammed the gear in the up position.

Since this was the first flight as aircraft commander for the pilot, I leave to your imagination what the final results might have been.

By now, you should be able to figure out why this article is entitled "Involved." All too often, people are reluctant to get involved, but because one conscientious petty officer did get involved, the accident-free record of one Navy squadron was preserved. It is involvement like this which serves to remind us all that "Safety is Everybody's Business."

I know I speak for all aviation safety officers when I say thanks to that young man for being concerned. How about you?

ASOmouse



Anymouse Special

TransPa...nic

IT was ironic that, after 2 months of having the bad guys shooting at us, the closest call of all for my stick and me happened on the way home.

The second leg, from NAS Big Island to NAS Little Island, was the one that sent the pucker factor almost out of sight. As the backseater in our fast mover, I was totally inexperienced in the rigors of a TransPac. I wasn't too worried about it, however, despite the facts we were dash five in the serial and had lost our nav aids on the first leg. (There wasn't a whole lot for me to do except enjoy the ride, and the beautiful weather should have made the ride enjoyable.)

We departed NAS Big Island on a beautiful morning and headed east. Our fuel was transferring as programmed, and we rendezvoused with our tanker on schedule. Then came our *first surprise* — the tanker, an A-3, couldn't give us a full bag. After a sip instead of the expected full drink, quick calculations indicated we'd arrive at NAS Little Island a little "skosh" — but with adequate fuel for a VFR approach and landing. Onward, stick!

About halfway, we went solid IFR — *second surprise*. You can imagine as dash five in the formation, IFR, it caused us to do a lot of jockeying around using a few more pounds than expected. The tanker, unfriendly cuss that he was, had moved out about 100 miles from our course. Onward, stick. We contacted Center, who told us NAS Little Island was VFR.

The flight leader told Center we were low state, without nav aids, and wanted a free ride in on dash three's wing. We commenced penetration and during descent lost our airspeed indicator — *third surprise*. We

left Center and switched to Approach — who obviously didn't understand our problem. Approach tried to split us from dash three *twice* — even after an explanation!

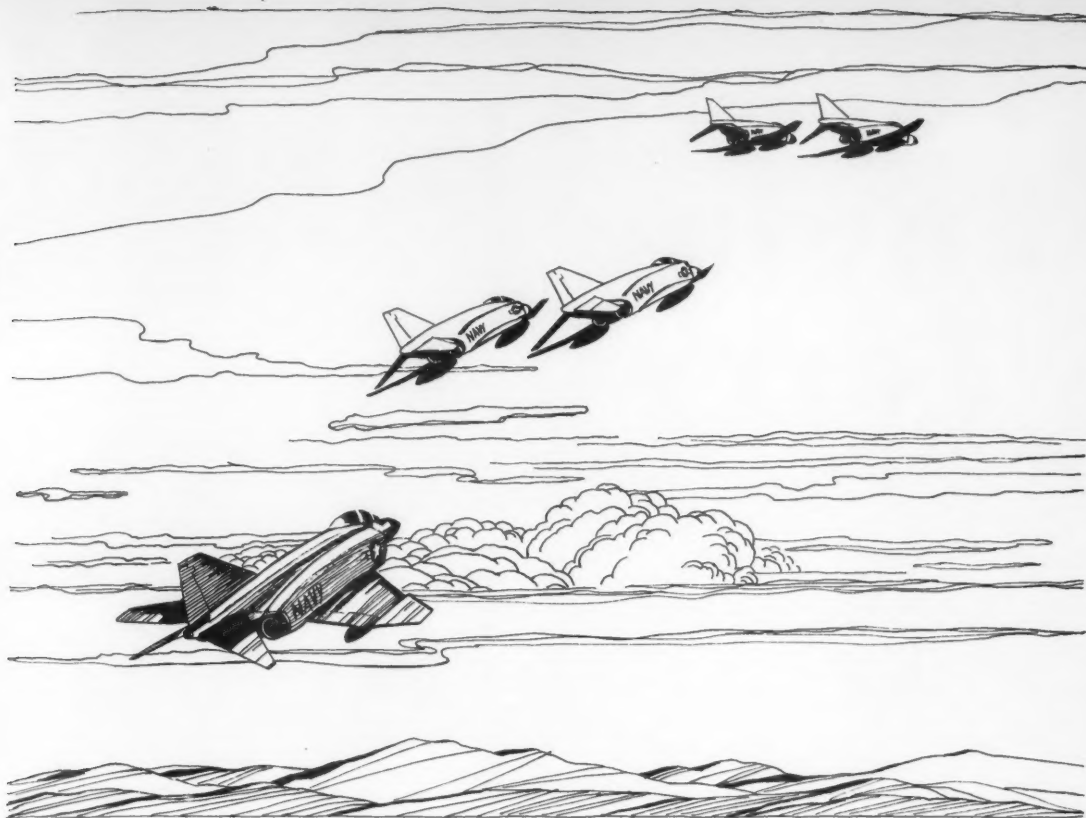
It was now time to declare minimum fuel, which we did. Our spirits rose when Approach allowed as how the field was still VFR. (Little did they know.) We switched to GCA and descended to minimums — *fourth surprise*, no runway in sight, waveoff!

Guess what time it was now. It was E minus 3 (eject in 3 minutes) and counting. We declared an emergency, and would you believe GCA switched us back to Approach? After an eternity (10 seconds), we raised a controller and he took forever (10 to 15 seconds) to relocate us and begin giving vectors. Once more we were handed off to GCA who decreased our morale from lower than a snake's belly to zilch. He advised in a calm voice that we were off his scope, and he didn't know where we were.

In a high, squeaky voice I told my stick I was set for a controlled ejection in case of flameout. Just then we both caught a glimpse of a single strobe approach light at 3 o'clock. In less time than it takes to tell, stick did an octafluger into the field. We landed halfway down the runway, dropped the hook, and took the overrun gear. We shut down on the taxiway with 100 pounds of fuel — 15 seconds left after a 3-hour flight.

Obviously, you'll say, a classic case of things turning to worms and getting progressively wormier. I blame it on complacency and an unbridled desire to get home. It's amazing how confident every individual is that this situation will never be experienced.

We had no control over the fuel we didn't get and no



control over the weather. One thing, though, that should have been different was our handling by Approach and GCA. The time we lost shifting frequencies, and more importantly, the time for the controller to reorient was nearly decisive. That hurts!

I'm 100 percent in favor of anything that can be done to implement single-frequency, single-controller approaches. My ASO also wonders why in hell we can't get KC-135s for TransPacs. We were lucky.

VMFAMOUSE

Ja, you vere luc-kee. (And not too smart, maybe.) Now, wait! Don't get all uptight. As the man said, "Let us reason together."

Before you ever left Big Island without nav aids, discretion, good judgment, or common sense (choose one) should have dictated a fix. Since you and stick anted up and decided to bluff it through, why are you so surprised you were called? Only rarely is a big pot flat-out stolen.

Once you departed with the serial, in your condition, it was like standing pat with one pair while the others

were making a draw. True that when you were denied full petrol and flew into IFR conditions, it was bad luck. However, how often have you not tanked full when you expected to? . . . and how often have you flown an extended flight, 1500 miles or more, when the weather didn't turn sour? I think you'd have to agree that your batting average is no better than .500 on both counts.

Now to the nitty gritty. I'll bet, because of a feeling of guilt or some other reason, you didn't holler, or scream, or tell the world about the lousy Center/Approach/GCA handling. Natch, we seldom hear about the thousands of outstanding efforts of controllers in emergencies, but the one you described is far out. No thanks to them, you made it anyway.

It wasn't too many years ago (before inflight refueling) that only VP/VR types headed out across the briny, and when they did, it was only after hours of careful planning, thorough briefings, and attention to the minutest detail. Their track record after 40 years of transocean operations is pretty good. Please, you guys, no more surprises. ◀

Three-Engine Ferry

An Epic of "How To," By the Book

By LCDR R. A. Lundstrom
and LT R. B. Kidd
VP-30



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P-3 AVIATORS will agree that three-engine landings are relatively common occurrences in their aircraft. The P-3 NATOPS details no less than 15 separate malfunctions which require shutdown of the T56 engine either as a precaution or necessity. As a result, though they are not everyday happenings, three-engine approaches and landings exist as a fact of life in the P-3 community. A pilot who finds himself several thousand feet high with only three functioning powerplants in company with a number of other souls and several million dollars worth of airplane possesses an understandable drive to see the flight through to a successful landing.

Three-engine takeoffs, on the other hand, are anything but common. The rationale of taking the duty in a P-3 with only three fans turning can be explained by either an inordinate degree of bravado or an equal or greater amount of cranial density. But, hopefully, this decision will be based on a *carefully planned three-engine ferry operation* (when no other solution is available).

The need for three-engine ferry arises only when an aircraft is down for a propeller or engine malfunction at a field which does not possess adequate repair facilities and where other solutions prove impractical. In such cases, the squadron CO may approve a one-time,

three-engine flight to deliver the aircraft to a suitable maintenance facility.

So rare is the three-engine ferry that it is not a practiced or demonstrated procedure. The evolution is, however, covered extensively in NATOPS. And, if NATOPS rules and procedures are followed correctly, it should be completely safe and generate minimum

excitement. The Atlantic Fleet P-3 Replacement Training Squadron, VP-30, recently conducted a three-engine ferry, returning a disabled aircraft to NAS Patuxent River after an emergency landing at an outlying field. The malfunction occurred as the aircraft was on a routine fam flight, operating in the VFR pattern at a field almost 400 nm from Patuxent River. As the aircraft was turning downwind after a touch-and-go, No. 4 engine suddenly oversped to 103.5 percent, shaft horsepower went to zero, and the chip light illuminated.

The engine was secured in accordance with NATOPS. The feathered propeller, however, began to rotate backwards. NATOPS procedures for securing a prop rotating backwards were attempted but were ineffective. Taking this compounded malfunction and deteriorating weather conditions into account, the instructor pilot elected to land immediately rather than return to Homeplate. The ensuing three-engine landing was uneventful.

Subsequent investigation revealed internal failure of the reduction gear which would require a complete engine and prop change. Due to the lack of P-3 maintenance facilities at the field, a three-engine ferry flight was decided upon — to commence the next VFR working day.

Two squadron instructor pilots, the QA flight

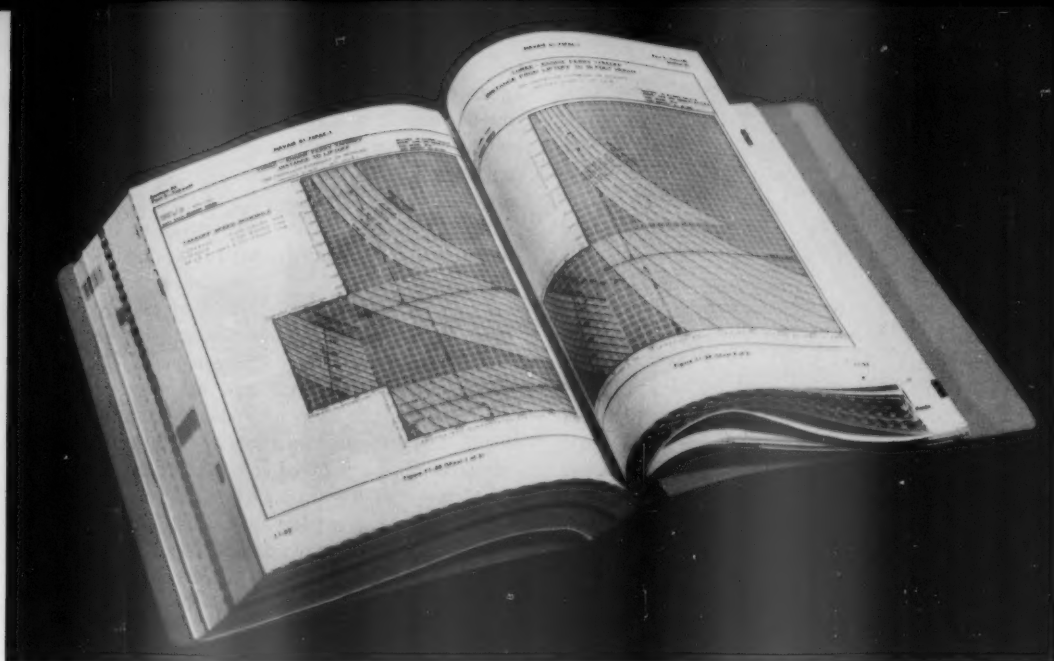
engineer, a communicator, and an observer constituted the five-man ferry crew flown to the site of the disabled aircraft. They were accompanied by a maintenance crew sent to prepare the aircraft for its flight home. The propeller could not be locked (the reduction gear failure rendered the prop brake inoperative), so it had to be removed from the aircraft. After removing the prop, the maintenance crew fitted a specially-constructed plate over the exposed reduction gear assembly and covered the air scoop to prevent air flow and engine rotation, precluding further damage to the engine.

While the maintenance crew was thus engaged, the pilots continued their personal preparations for the flight, considering the special precautions and techniques which would be required. The weather would pose no problem — VFR from departure to Patuxent River.

The fuel load was less than usual to keep the gross takeoff weight below the desired 100,000-lb maximum, while 1000 lbs extra was carried in tank No. 4 to compensate for the weight of the missing propeller. This balance would be maintained throughout the flight by crossfeeding. The supplemental three-engine ferry checklist prescribed by NATOPS was completed.

It was readily apparent to the ferry crew that the takeoff would be the most difficult segment of the flight. The normally-routine considerations of minimum control speeds (V_{mc} ground and V_{mc} air) in this case





A very important aspect contributing to the successful flight was the crew's consideration of NATOPS . . .

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took on added significance. Vmc ground is the lowest speed at which the pilot can maintain directional control on the runway if the critical engine becomes inoperative on the takeoff run. With maximum power set, this is 102 knots. This meant that the pilot could not apply maximum power on the asymmetric engine (No. 1) until the aircraft had exceeded 102 knots.

Vmc air is the minimum speed at which directional control can be maintained in the air with the most critical engine(s) inoperative. It varies with the number and position of the inoperative engine(s), power applied, and bank angle. For this takeoff, Vmc air would be 112 knots at best, only three knots below normal rotation speed. Because this is usually the case with three-engine takeoffs, NATOPS recommends a minimum three-engine ferry rotate speed of 130 knots.

The flight crew then entered the three-engine takeoff performance charts to determine takeoff distance and obstacle clearance. At the recommended weight with rotate speed at 130 knots, liftoff would occur at 136 knots, and optimum climb speed to clear a 50-foot obstacle would be 140 knots.

After filing an IFR flight plan, the pilots conducted a thorough crew briefing by which time the aircraft had been made ready for the flight. Start and taxi were normal, and after a last-minute briefing to review procedures, the aircraft took the runway. The plane commander held the brakes and applied full left rudder as the flight engineer added maximum power on No. 2 and 3 engines, and the copilot held the yoke forward

with full left aileron.

With maximum power set, the pilot released the brakes, maintaining directional control with nosewheel steering as the aircraft accelerated. At approximately 55 knots, the pilot felt the rudder become effective and discontinued use of nosewheel steering while adding power on engine No. 1 from flight idle. Application of power on No. 1 was facilitated by the existing left crosswind which served to counteract the effects of asymmetric power. Full power was applied about the time Vmc ground was reached. Upon reaching 130 knots, the pilot rotated the aircraft, lifted off, raised the gear, and maintained the prescribed 5-degrees left wing down to enhance directional control by minimizing Vmc air.

Takeoff distance was observed to be just 4200 feet on the 8000-foot runway. The ensuing three-engine climbout and cruise back to Pax River were uneventful. During the flight at altitude, the crew discussed the approach and landing. The GCA and three-engine landing were very smooth and without incident.

The entire three-engine ferry operation went off without a hitch. Part of the credit must be attributed to the aeronautical expertise of the maintenance and flight crews. Another very important aspect contributing to the flight's successful completion was the crew's thorough briefing and consideration of NATOPS procedures, aircraft limitations, and existing conditions. The professionalism of all concerned made this potentially hazardous evolution "a piece of cake." ◀



Landing the A-7

HISTORICALLY, the landing phase of flight operations has proven to be one of the most hazardous and most unforgiving of human error. Landing the A-7, *Corsair II*, in particular, requires advance planning and competent follow-through to ensure a safe operation.

Once the A-7 touches down, the pilot's job has just begun. Factors such as high residual thrust, poor manual braking, and a tendency to blow tires have cost the Navy many valuable aircraft. In an effort to reduce landing incidents, the following guidance is reiterated:

- The A7C/E antiskid must be maintained and utilized as it was intended, to help alleviate blown tires under all runway conditions.
- When the decision is made for an arrested landing because of adverse runway conditions, the possibility of a hook-skip bolter should be considered, and a go-around executed if aircraft and weather conditions permit.
- If a field arrestment is planned, maintain proper aircraft attitude (nose strut fully extended) until a wire is engaged.
- During a normal landing, if the aircraft has not decelerated below 100 knots at the 4000-foot marker, initiate a waveoff and set up for another approach.
- If a tire is blown on landing, nosegear steering is the primary means of maintaining directional control and must be utilized.
- Shutting down the engine is not recommended as a means of stopping the aircraft unless a short runway with no arresting gear is used and no adverse crosswind exists.

Adapted from a recent COMLATWING ONE msg.

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Needle, Ball, and Ripcord



For a sense of adventure, come back to an airways flight of 33 years ago. Marvel at the way things have changed. It was doubted then that even an experienced pilot could handle an instrument letdown in a single-control plane.

Pensacola, Florida — A group of instructors gathered at the home of Lieutenant J. T. Workman, USNR, Officer-in-Charge of the instrument division in Squadron VN5D8, on the evening of 26 December 1939. This assembly had enthusiastically expressed a desire to attempt precision navigation under "instrument" conditions in "single place" aircraft.

The instructors, time, and planes for such a flight were made available during the holiday period. Numerous points in flying the airplanes were cleared up in the minds of the pilots. Detailed instructions as to what might be expected in letdowns were covered, particular attention being paid to procedure in bringing in a "stack-up."

At 0900 on 27 December, seven planes took off and rendezvoused over the field. After having opened up the formation, pilots in the rear cockpit went under the hood. Navigation was found to be "duck soup." Ground speed and fixes were determined more accurately than they would have been by contact.

The flight took the Pensacola beam to the intersection of the Pensacola-Mobile beam, establishing the first fix. Then taking the NE leg of the Mobile beam out until the weak Montgomery beam could be picked up, another fix was established over this station. About 5 minutes out of Montgomery, the flight shifted to the Atlanta beam and flew the SW leg in.

A flight plan for the whole flight had been sent to Atlanta prior to departure. Approval of the plan had been acknowledged in the air through Mobile Radio. As soon as Atlanta was contacted, that station took charge of the flight. From this stage on, events occurred fast and furiously.

The ceiling was a little over 3500 feet at Atlanta. Consequently, to avoid flying under actual instrument conditions, Atlanta stacked the first four planes over the station. The remaining three planes were directed to shuttle back and forth at assigned altitudes 5 minutes

from Atlanta. At this time, there was no marker on the SW leg; consequently, a dead-reckoning position for the shuttle had to be taken. This same method would be used under actual instrument conditions if icing conditions existed at higher altitudes.

The stack developed satisfactorily in both cases. However, considerable doubt exists in the minds of the pilots in the flight as to whether even an experienced pilot can satisfactorily handle a letdown under similar circumstances in a single-control plane.

Much has been said recently about complicated flying machines and the many gadgets that require the pilot's attention.

Now, in addition, the pilot on instruments has to bracket a beam, establishing the course he has to fly to stay on the right-hand edge; he is constantly operating the radio, giving positions, courses, and altitudes, and to do this, he has to do some fast and fancy navigating.

Just about the time the pilot reaches a certain altitude on a certain leg, either the altitude or the leg, or both, may be changed. And this, in addition to listening through the same beam for broadcasts! He has to watch his clock, airspeed, and turn and bank, or artificial horizon (if he is fortunate enough to have one). In addition, all his other instruments still require the normal amount of attention.

After all the planes had landed, Mr. Taylor, Atlanta CAA representative, took charge of the group and showed how various situations were handled, giving practical demonstrations in the control tower. Mistakes were pointed out and suggestions made.

After a good, warm lunch, an uneventful return flight was made.

The interest and cooperation of the CAA group and their willingness to help service pilots was very encouraging. The Civil Aeronautics Association desires in return only that naval pilots fly the airways in accordance with the Civil Air Regulations.

PILOT ERROR

By Earl J. Ends, Ph.D.

(The following article by the head of the human factors group in the Human Engineering Department of the Lockheed-California Company first appeared in INTERCEPTOR magazine. APPROACH does not agree entirely with Dr. Ends' pessimistic conclusions that the selectivity and screening process has reached its limit of effectiveness in eliminating accident-producing individuals from the program. However, we recognize that he cites this conclusion to underscore his primary theme, i.e., that reduction of pilot error accidents is largely an individual pilot responsibility. — Ed.)

PILOT error is cited with distressing frequency as a primary or contributing factor in aircraft accidents. While statistics vary, pilot error is a significant factor in well over 50 percent of all aircraft accidents.

Before you take comfort from the fact that accident rates per hundred thousand miles or per thousand flying hours are going down, remember that the number of aircraft accidents per year is going up. This means simply that more pilots are making more errors each year than ever before. *(Overall, both the rate and number of Navy/Marine Corps accidents have decreased over the last 3 years. However, there has been an increase during the current Fiscal Year 1973 in both the rate and number of accidents when compared to Fiscal Year 1972. Pilot factor has accounted for approximately 50 percent of FY-73 accidents compared to 40, 43, and 41 percent for Fiscal Years 1970, 71, and 72, respectively. — Ed.)*

Indeed, some accident statisticians maintain that as long as we have aircraft, we will have pilot error accidents because the human animal is not perfect. Perfection of the human species does not appear to be an imminent occurrence, so the statisticians are probably correct. The accident participants — or their loved ones — will have to find their consolation in the knowledge that they were victims of low probability events.

But must we accept this fatalistic view of pilot error accidents? The answer is clearly a definite "No!" The fact that accident rates have been gradually reduced over the years indicates that concerted effort aimed at flight safety can pay off handsomely.

Study after study has shown that human failure

remains the biggest single factor in all accidents whether small or great. At the same time, analysis of accidents with the benefit of 20/20 hindsight shows that any specific accident could have been prevented by someone — most often by the pilot.

Short of concluding that the pilot should have zigged when he zagged, how could most of these pilot-error accidents have been prevented? Better pilot selection? Better training? Better ground control? Better aircraft? Better instruments? Better cockpit design? All of these have been proposed to reduce pilot error and have doubtless contributed to the reduced accident rate. But let's examine them briefly to see if we can determine just where pilot error begins. If we can locate the source, we can begin to take proper corrective action.

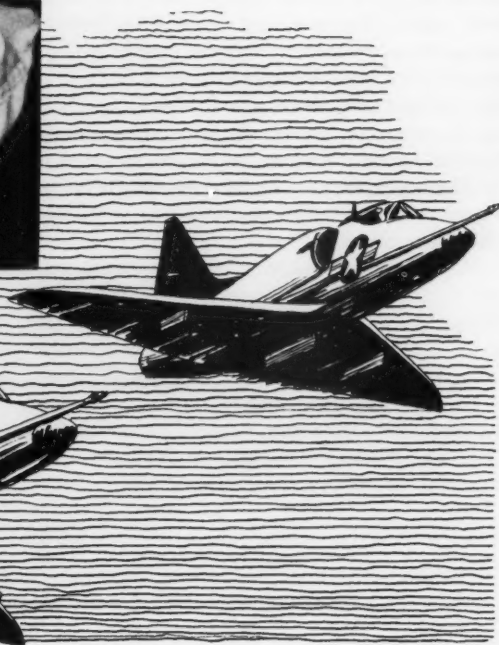
Do pilots who have accidents tend to be accident-prone individuals? If so, by devising appropriate selection techniques all such individuals could be eliminated from pilot training. This should virtually wipe out pilot-error accidents. Research studies aimed at discovering the distinguishing characteristics of pilots who have accidents, however, have failed to find any consistent individual differences between them and those who do not.

One study covering an 8-year period and some 7000 accidents demonstrated that past accidents are not predictive of future accidents as far as the individual pilot is concerned. Furthermore, accident rates in conventional aircraft did not predict a pilot's jet accidents. Nor did his training accident predict his post-training accident rates. Other studies have shown similar results.

These results lead to the conclusion that current pilot selection techniques are already as effective as possible in eliminating accident-prone individuals. Even better screening of trainees does not, at the present time, appear to hold out much hope as the best way to eliminate pilot-error accidents. Current procedures are quite effective in eliminating poor risks from training programs.

What about the possibility of reducing or eliminating pilot-error accidents by better training programs for those who pass the rigorous selection screening? Most would agree that the quality of training received in any complex skill such as flying will significantly influence the safety with which it is practiced.

But will even better training reduce current pilot-error accident rates? If so, one would expect that those pilots who do best in flight training would have fewer accidents. However, a number of studies addressed to this hypothesis have shown only very slight relationships between performance in flight school and individual accident rates. Furthermore, training



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programs are not only as effective as we currently know how to make them, but also are approaching the limits of economic feasibility.

Nevertheless, higher performance aircraft have higher accident rates not only because they demand more skill of the pilot, but also because they are less forgiving of pilot error.

While formal training programs can and do improve pilot skill levels to a level required to safely operate a given aircraft, they have not succeeded in preventing pilot-error accidents. It seems unlikely that any training

program, by itself, can ensure that a pilot will be accident-free throughout his career.

Besides, no training program turns out a finished product. Training can only prepare you for on-the-job learning which continues throughout your career. As any pilot knows, constant practice is required to maintain proficiency. No pilot expects the level of flying skill he achieved in training school to become his permanent minimum flying performance level. Complex skills such as flying rapidly deteriorate with disuse. Most pilots recognize this fact and attempt to get in enough flight

time each week to maintain their proficiency levels.

But what is the proficiency that is being maintained? Apparently the practice is aimed primarily at maintaining skill in flying under more or less routine conditions.

Pilots, like most other people, tend to practice most those things they *already do best*. Evidence of this is supplied by a study of a large number of accident histories of high-performance fighters and fighter-bombers. The investigator found that emergency procedures were necessary in almost 95 percent of the cases. They were used in approximately 85 percent, but in the cases where used, over half of the emergency procedures were incorrect. Furthermore, increased flying experiences did not appear to be associated with an increased proportion of correct emergency action!

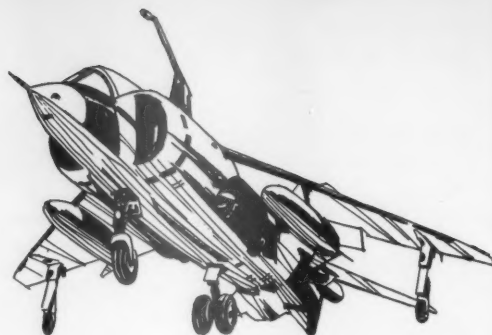
Here at last we have a clue as to where pilot-error accidents start. When the pilot is not proficient in procedures for safely handling a specific malfunction or equipment failure, pilot-error accidents result.

There are indications that many pilots do not practice emergency procedures enough so they can accurately perform these during a real emergency. The point here is that proficiency is not only a matter of the number of hours spent in the air, but is equally a matter of the way in which this time is spent.

Could pilot-error accidents be eliminated by relentlessly drilling us all so we could properly perform the necessary emergency procedures? While such an approach would doubtless result in a rather dramatic reduction in pilot-error accidents, they would by no means be eliminated. The reason for this is that even the correct emergency procedure, if applied too late, can have the same disastrous consequences as failure to use the correct procedure — and the cause is still charged to pilot error.

Where does this type of pilot error start? Is it possible to significantly reduce or eliminate pilot-error accidents in situations where the pilot presumably knows what to do but either fails to do it or does it too late to prevent an accident? What kind of contributing factors can restrict, reduce, or degrade a pilot's normal capabilities to the point where he may become another pilot-error accident statistic?

First, we should digress to emphasize that safe piloting of a high-performance aircraft probably demands the highest level of sustained coordinated performance of which a human being is capable. It is little wonder that so many different factors have been cited as contributors to pilot-error accidents. Most are transient conditions which take the edge off a pilot's maximum performance capability, but without obvious outward indications.



Even worse, the pilot may be aware that he is not quite up to par, but kids himself into believing that once in the cockpit he'll be all right. Furthermore, on uneventful flights he may get away with it and, in so doing, convince himself that he can always make it, no matter how rough he feels. *But when a below-par day is combined with an inflight emergency, we have a perfect setup for a pilot-error accident.*

To get back to the insidious performance-degrading factors often cited in pilot-error accidents, we might first mention *alcohol*. Alcohol improves pilot performance to about the same extent it improves skill in driving an automobile! While alcohol is rarely cited as a factor in military or commercial aviation accidents, it is a fairly common factor in general aviation accidents, showing up in over 30 percent of the cases in several large studies.

Even without breaking the rules with respect to consumption of alcoholic beverages for the specified period before a flight, as one investigator puts it: "An all-night party introduces other degrading factors such as a contamination of the blood with carbon monoxide from smoking and the lack of sleep with resultant fatigue." He also mentions the debatable issue, as yet unresolved, which produces the most impairment — alcohol or the "hangover" from the consumption of alcoholic beverages.

Self-medication with a wide variety of proprietary drugs, such as the antihistamines used in many cold remedies, can take the edge off a pilot's performance. Many such medicines produce drowsiness as a side effect. For this and many other reasons, any pilot taking medicine not prescribed by or with the full knowledge and consent of his flight surgeon is flirting with disaster.

Fatigue probably contributes to more pilot-error accidents than we realize. The reason for this is obvious: unless fatigue is extreme, only the pilot is aware of it. Yet looking at the symptoms of fatigue, the nature of the performance decrement associated with it,

some interesting relationships appear. For example, fatigue may result in sloppy flying even by a pilot who is normally quite meticulous.

The number of errors on virtually any task increases with fatigue, and flying is no exception. The increase in errors is even greater under adverse weather or other circumstances. Furthermore, fatigue may result in failure to respond rapidly and properly in an emergency situation. Other common adjuncts to fatigue are narrowing of the visual field, reduced attention span, reduction in normal scanning movements of the eyes, slower comprehension of events in the cockpit or in the external environment, and slower and less flexible psychomotor performance in general.

While the factors mentioned by no means exhaust the long list of contributors to pilot-error accidents, they should suffice to make one point clear: pilot error starts with the pilot. That, in turn, makes another point equally clear: elimination of pilot-error accidents must begin with the pilot.

Improved selection and training, more positive ground control, better instrument design, more sophisticated human engineering in the cockpit, and even superior handling qualities of the aircraft can go

only part of the way in reducing aircraft accidents. Improvements in these areas can scarcely keep pace with even higher performance systems, and at best can only make it more difficult for a pilot to make an error resulting in an accident.

You, alone, can acquire and maintain proficiency in all emergency procedures for your aircraft. You, alone, know whether you now have that proficiency and whether or not you are maintaining it at the level required to save your ship and perhaps your life should an emergency occur.

Your flight surgeon will sometimes know when you have no business flying, such as when you are under medication or other treatment for one reason or another. But much of the time you, alone, know that you are under par, whether from a hangover, a sleepless night, fatigue or financial worries, or any of the host of other things that can impair your performance.

To prevent yourself from becoming one more statistic in the pilot-error column in the aircraft accident summary, you might add the following item to the top of your preflight checklist:

If a serious inflight emergency occurs on my next flight, will I be able to handle it? Yes___No___.

CH-53 Pilots Only

HERE'S a hairy one that all H-53 pilots will want to store in the memory bank in case the situation arises again.

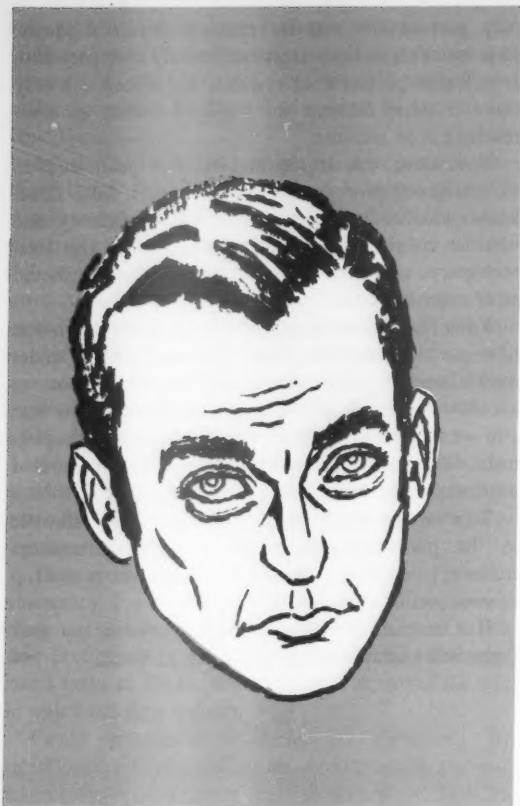
The crew of a CH-53A departed a municipal field enroute to a not-too-distant AFB. While climbing through 1500 feet in a right turn, a shudder was felt. Simultaneously with the shudder, the cockpit master caution and No. 1 engine caution and chip lights came ON.

Losing altitude in a right skid, the pilot reacted by lowering collective, rolling wings level, and calling for full power. After regaining N_T to 102 percent and 120 knots airspeed, he regained full control. *His altitude bottomed out at 300 feet.* The HAC then called for No. 1 to be secured and returned to his point of departure where he made an uneventful landing.

Taxiing to the ramp, the pilot watched his windshield begin to bubble, discolor, and melt. He found the pilot's windshield anti-ice switch turned on LOW. The switch had not been intentionally turned on, and it is surmised it had been unintentionally activated when the No. 1 engine T-handle had been pulled for engine shutdown.

A 4 x 6-inch hole was found in the No. 1 engine exhaust tailpipe at 1 o'clock, just aft of the tailpipe mounting flange. The cause of the engine failure and the cracked exhaust has not been determined.

This incident took place on a day, VFR flight. It might have ended quite differently under IFR conditions. The pilot is to be commended for flying the helicopter first, directing action to secure the bad engine *after* he had everything under control, and then effecting an uneventful landing.



IF you were sick last night, don't fly today. Don't rationalize your symptoms as "something I ate," "the squadron party," or "it's all in my mind." You might be wrong!

Last winter, a student naval aviator spent a sleepless night due to vomiting and diarrhea. He hadn't flown for more than 3 months and was on the schedule for an area check and warmup fam flight the next day. To turn a phrase, a little psychology is a dangerous thing. He performed some self-analysis and diagnosed his troubles as anxiety.

The next morning on the flight line, the student's instructor noticed that he didn't look well. "No less than four times," according to the squadron's report of the incident, the instructor asked the student how he felt. The student said that he hadn't felt too good the night

before, but insisted that he was physically ready to fly.

During preflight and the first part of the flight, all went well. Then the student began to feel nauseated. At this point, he asked the instructor to descend and practice touch-and-go's. (The report doesn't say here whether or not he told the instructor that he was sick.)

As the aircraft approached initial, the student became extremely nauseated, vomited into a bag, and grayed out. He doesn't remember anything more until the flight was on final where he could barely make out the ball.

The instructor informed the flight duty officer and set up for a straight-in. At 5 miles out, before contact with the tower, the student began to revive. He was fully conscious at 3 miles. For this reason, the squadron report says, no emergency was declared. The flight duty officer, however, had already called for an ambulance to meet the aircraft. The landing was uneventful.

The student was able to leave the plane unassisted, but he was quite unstable and disoriented. At the dispensary, he began to have chills and was hyperventilating and nauseated.

"Although anxiety may have been a significant factor," the flight surgeon stated, "the student had the flu."

In his review of the incident, the squadron CO addressed himself to the difficult question of where responsibility lies at a time like this.

"This command has frequent pilot briefings by both the flight surgeon and the aviation safety officer on the dangers of self-diagnosis and self-medication," he writes. "In addition, the command policy that no individual is allowed to fly any mission unless he feels fully capable, both physically and mentally, has received wide dissemination. The student was aware of these policies and violated them, exposing himself to an extremely serious potential risk . . .

"It is not enough for an instructor to merely accept a student's opinion at face value as to whether he is physically able to fly. On the other hand, an instructor should not make a medical diagnosis. Any indication of physical distress, either through student's self-admission or instructor's observation, should be investigated by qualified medical personnel."

This particular incident occurred in the traditional flu season last winter, but flu viruses don't necessarily abide by the calendar.

June or January, if you feel "buggy," don't fly. ◀

Self-Diagnosis

notes from your flight surgeon

No Cavities

A GOOD, well-balanced breakfast gives you energy to start your day. Now, according to one authority, there's another reason to eat breakfast — *people who don't eat breakfast have more cavities in their teeth.*

How's this work? Well, the idea is that without breakfast, your blood sugar level drops greatly by the middle of the morning. To make up for this, the breakfast skipper snacks on sweets and carbohydrates — candy bars, pop, assorted gedunk — all day long. With each bite, an acid reaction in the mouth reportedly occurs for about 20 minutes, and this is what starts tooth decay.

If the dentist's drill is a threat to you, think it over. Breakfast might be the answer.

Absorbs Impact Energy

WHEN there was an explosion and fire in an EKA-3B bombbay just after landing, the crew escaped virtually uninjured.

The only man hurt was an ADJ2. He dislocated his shoulder and broke his heel and nose when he jumped 13 feet to the taxiway.

His APH-6 helmet and visor absorbed considerable energy from his fall and prevented serious facial and skull injuries.

Breathing Problems

BREATHING problems complicated the survival of a helo rescue crewman after the helo ditching. As soon as he inflated his UDT vest in the water, the neck section pushed the back of his SPH-3B helmet up. This markedly

tightened his already tight chinstrap, making breathing very difficult, and forced his face into the water.

Both the pilot and copilot went to his assistance. One held the crewman's head up, and the other deflated his UDT vest while he, himself, tried to loosen the chinstrap. Thus his breathing problem was resolved, but the buoyancy of his lifevest was impaired.

In his investigation, the squadron flight surgeon experimented with this gear in the water and confirmed the problem.

"In an ordinary rescue situation," he states, "the rescue crewman takes his helmet off before entering the water to assist survivors. In this case, however, the aircraft was ditched and he left the aircraft, already in the water, as a survivor. *(The inflated UDT vest is not compatible with flight helmets. — Ed.)*

"Loosening the helmet chinstrap and/or partially deflating the vest with wet gloves and cold hands is difficult. It's conceivable that with a sea state of any significance, with no one around to assist him, a survivor could rapidly find himself in deep trouble."

The flight surgeon endorses the rescue crewman's strong recommendation that the helmet chinstrap, in such a case, be loosened before the UDT vest is inflated.

Thirsty

"I WOULD suggest that SAR helos carry some fresh water. I was more than a little thirsty and had a bad salt taste in my mouth."

Pilot after ejection



At JEST (Jungle Environmental Survival Training Center), NAS Cubi, a recent 2-day seminar brought together SAR and environmental survival training representatives from the Army, Air Force, and Navy. Here, a JEST Negrito guide, an Army captain, and a Navy chief examine the "iodine tree," the leaves of which contain a milky sap useful in treating wounds.

A major topic at the seminar was improving helicopter rescue procedures, particularly for airmen picked up under combat conditions.

Seasprite in a Spin!



HELICOPTERS without tail rotors don't fly straight and level too well. Matter of fact, when you lose tail rotor drive, you're guaranteed a ride similar to a trip in a centrifuge. This type of emergency, however, usually happens only after a warning or series of warnings — but it could happen instantaneously. Here's what happened recently to an SH-2D.

The LAMPS helicopter was on a routine RECON/ASW flight one morning enroute to check out a contact. The day before, the pilot had experienced lateral control problems in this bird, but today the helicopter was flying smoothly.

After checking the contact, a controller gave the pilot a divert to a ship to drop off some parts. At the time, the pilot was cruising at 1000 feet between 90 and 95 knots. Shortly after turning toward the ship, a loud bang was heard. The aircraft began to vibrate and pitched slightly nose-up while yawing left.

The pilot took control from the copilot, declared an emergency, and reduced airspeed to 70 knots. Initially, he thought they might have experienced blade stall. The helicopter was brought under control and flew smoothly for a few minutes. During this time the pilot descended to 500 feet and headed toward another ship with a larger helicopter platform, intending to make a run-on landing.

A clue that all was not right was evidenced by a strong, medium frequency vibration, 4 inches of right rudder to keep the ball centered, and some left cyclic to maintain heading. The pilot rightfully suspected tail rotor drive problems, but took no further action in preparing the crew or aircraft for ultimate drive failure.

When the *Seasprite* was within 2 miles of its emergency deck, a loud "pop" was heard, then everything became quiet. The pilot transmitted "going in," called the crew to open the doors, and concentrated on the ditching. He had his hands full. The helo didn't respond to control inputs. During the first clockwise revolution, the helo pitched nose-up, then nose-down. When the helicopter hit the water, it was fairly flat, but vertical speed was estimated to be 3000/4000 fpm.

Statements of the surviving crewmembers indicate that the helicopter sank almost immediately after hitting the water and rolling inverted. Several of the survivors estimated they were 30 to 50 feet deep when they finally got out.

The mayday transmitted by the pilot alerted the ships, and the survivors were picked up promptly by a destroyer.

They might not have fared so well if there had been any delay in their rescue. One of the crewmen had difficulty in inflating his LPA-1. The copilot saw him disappear a couple of times and yelled to him to inflate his lifevest. The crewman couldn't find the lanyard and momentarily forgot to try again. When the copilot yelled at him, he removed his helmet and gloves and inflated his vest. The copilot didn't realize it, but his collar didn't inflate; and because of the quick pickup, he made no effort to blow it up.

The survivors had interesting tales to tell. The pilot reported that after getting out of the helo he hit his head on the landing gear and had to pull himself around it before starting up. The copilot also reported a brush with the landing gear as he got out. The crewman said everything in the helicopter seemed to break loose when they hit the water. Electronic gear tore loose from mountings, and some momentarily pinned the crewman's legs against his seat. After releasing his seatbelt, he had to move the loose gear to escape from the aircraft.

The other crewman was not recovered. It is suspected that he might have been either unable to release his gunner's belt or was blocked by debris.

The mishap board made several comments on the failure of the second crewman to egress. The board pointed out the inability of anyone to open the cargo hatch while strapped in, the less than satisfactory jump seat, and the inordinate difficulty in releasing the gunner's belt locking pin.

Their recommendations, supported by endorsers in-the-chain, included:

- A request for an engineering investigation of the tail rotor and tail rotor drive system.
- An evaluation of the locking device of the gunner's belt.
- Discontinued use of the jump seat, except in emergencies.
- Better availability of LPA-1 lifevests (in short supply) for survival training.
- Reevaluation of the location, support, and mounting features of the sensor operator's equipment.

All helicopter pilots are urged to read again *Tail Rotor Emergencies* by LCDR Tom Doyle in the April 1972 APPROACH. He discusses this type of emergency in detail, and his recommendations for handling tail rotor drive failure are worthy of APM discussions. "Study, preplanning, and a lot of autorotation practice can make your next tail rotor drive failure an incident instead of an accident," he points out. Further, "The key to success is in recognizing the symptoms, knowing the options, and taking immediate and positive action. The time to prepare for this emergency is now." ◀

Spotting the Problem



ANYONE who's been there will tell you that when a CVA goes to sea with a full bag of birds embarked, the flight deck is jampacked. Spotting these birds for various flight deck evolutions really puts aircraft handling personnel to the test. It is not only the number of aircraft that causes these stalwarts a problem, but also the great variety.

Sometimes a certain spotting arrangement cranks in a potential hazard to other aircraft. Then someone drops the ball, and zap, a mishap occurs. To illustrate, let's take a look at a recent mishap which involved aircraft spotting.

An A-7E pilot manned his aircraft 55 minutes prior to launch time. The *Corsair II* was parked on the foul line about 50 feet abaft the No. 2 JBD (jet blast deflector) almost athwartship.

Prior to start, the plane captain *removed the winglocks*. After start, the pilot turned on all desired equipment, which included engaging the wingfold switch



in the FOLD position. Following poststart checks, which were normal, the plane captain showed the pilot the gear downlocks and winglocks.

At this time, an E-2B positioned on the No. 2 cat was turning at idle. Shortly thereafter, the *Hawkeye* was given the two-finger turnup for launch. The A-7 pilot heard a muffled cracking sound and felt his aircraft jerk. Looking out of the cockpit, he saw that his port wing was folded about 45 degrees beyond the normal fold position. The plane captain then installed the landing gear downlocks, and the pilot shut down.

With the winglocks removed, the folded port wing of the A-7 was overstressed by the combined forces of the E-2 propwash and the existing wind over the deck. As a result, the wingfold rib (PN 215-70058) was broken at the actuator attach bolt hole.

The AMB (aircraft mishap board) concluded that personnel factor led to this accident. The plane captain removed the winglocks too soon. NATOPS contains a "caution" against exposing wing panels to lateral wind or jet blast with the winglocks removed.

The board also felt that the carrier's JBDs have a design deficiency in that they do not effectively block the propwash of E-2 aircraft, and that the folded wings of A-7s are particularly susceptible to damage from this source.

In his endorsement, the type commander made some pertinent comments:

- "The second endorser discusses operation of E-2/C-2 aircraft and the difficulties caused by propwash bypassing the JBD. This problem also occurs when operating certain other aircraft. Ships' aircraft handling personnel should be aware of this problem and every effort made to spot aircraft in the safest area possible to preclude mishaps of this nature.

- "Although the plane captain was responsible for ensuring the winglocks were removed only in compliance with established procedures, in this case the pilot knew the locks had been removed prior to start and could have required that they be replaced."

The above remarks pretty well fit the pieces into place concerning this mishap. The plane captain should *not* have removed the winglocks when he did. Yet, the pilot *knew* this and took *no* action to have them replaced. Aircraft handling personnel *knew* that the ship's JBDs were ineffective in deflecting E-2 propwash, but positioned an A-7 athwartship directly behind one.

Spotting aircraft on a flight deck is a science. It requires a tremendous amount of effort on the part of all involved in the operation to keep it efficient, and at the same time safe.

Up till now, no one has come up with a sure cure for eliminating all hazards associated with the positioning of aircraft on flight decks. When a problem is spotted, however, corrective action should be taken immediately. This type of can-do will reduce the mishap rate. ◀

Bravo Zulu




28

LTJG James E. Varnado of HC-3, Det 103, and his crew, in a UH-46D, were in a hover over the fantail of a destroyer. While lowering a passenger during a routine personnel transfer, the No. 2 engine failed.

The first indications, in rapid succession, were a reduction in N_r , loss of No. 2 N_g , and a fire warning

light. The crew swung into action immediately! The copilot secured No. 2 engine, armed the ETS (emergency throttle system) on No. 1 engine, and started and crossed over to the APP. The hoist crewman quickly recovered the passenger while LTJG Varnado, maintaining helo control, waved off and proceeded to a safe landing on MARS.

LTJG Varnado's crew coordination was exemplary in recognizing the emergency, following NATOPS procedures, and preventing a possible catastrophic mishap.

COMNAVSAFECEN concurs in COMFAIRSANDIEGO's WELL DONE to LTJG Varnado and each member of his crew for their flawless performance. 

approach/february 1973



Letters

*A cold is both positive and negative;
sometimes the eyes have it and
sometimes the nose.*

William Lynn Phelps

Sea King Bilge Pump

NAS, Quonset Point — A number of H-3s have been lost because they have taken on water during an emergency water landing. The weight of the water makes the helo too heavy for a single-engine takeoff, no matter how much fuel is dumped. I have a suggestion.

The suggestion is to turn the existing fuel-dump system into an ejector system using one hose and a one-way stop valve. Run a hose (with a screened, flared inlet) from the lowest point of the hull to the end of the fuel dump tube. Incorporate a one-way check valve in the hose at this point to prevent dumping fuel into the hull. Make a slight venturi out of the dump tube to create negative pressure in the hose. Thus, if you land an H-3 in the water and have to get rid of weight, not only can you dump fuel, you can also pump your bilges.

This design change may not be the best way to keep the bilges dry, but it's a cheap, light, easily-installed way to modify existing airframes. It's also a whole lot better than the "nothing" available to the Fleet now. Please check

and see how many megabuck helos have been unnecessarily lost for lack of any system to pump sea water from the bilges.

LTJG William M. Teppig, USNR
HS-5

• We have, indeed, lost several megabuck helicopters for lack of a system to pump the bilges.

Your idea makes sense to us, and it could possibly result in a speedy (and apparently needed) fix. We suggest you initiate a letter through your chain-of-command to NAVAIRSYSCOM. State the problem simply, as you have here, but include some sketches to best illustrate your ideas, referring to the IPB/MIM as necessary for illustration, clarity, and accuracy.

Forward a copy of your letter to the Safety Center, and specify that "by copy of this letter, COMNAVSAFECEN is requested to comment."

Taxi Signals

FPO, San Francisco — I have been in the Navy for 3 years and 10 months. I have, in that time, seen many unsafe things. Most of the time, however, I observed them from a distance and wasn't involved.

The one time that I was involved happened last July at NAS Western. The exact location was a helicopter line. Three helos were involved in a near tragic accident.

I'll try to explain everything carefully. One squadron operates H-3

helos, and the line parking area is concrete. The parking area has large circles painted with squares inside to spot the mainmounts of the H-3. If the mainmounts are on the squares, the helo will be in the center of the circle. The main rotor blades can then be spread, and the blade tips will still be within the diameter of the circle. My squadron's helicopter was in a transient maintenance status and was parked, but not centered, in a circle. To our right was an empty space, and next to that space was an H-53. The H-53 blades were spread and overhung the diameter of its circle.

I'm an AMS-2 and had to change the blade-fold safety valve on our bird. I finished installing the valve and turned the cannon plugs over to two electricians to hook up. I knew it would take the AEs at least 10 minutes to attach the plugs and safety them, so I went to the hangar for a coke.

I returned to the helicopter as an H-46 was landing. No one went out to provide assistance, even though their people were at the hangar. My first thought was to direct him into a parking space in front of my helo. Just as I raised my arms, two linemen ran out. One went behind my helo, and the other went to the empty space between the H-53 and the H-3. By this time, I was in front of the H-3. (Don't forget the two AEs were inside working.) The director between the birds took charge, and I don't know where the other man went. I saw that it would be a tight fit and gave the pilot in the left seat a thumbs UP for blade tip

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request.

Address: APPROACH Editor, Naval Safety Center, NAS Norfolk, Va. 23511. Views expressed are those of the writers and do not imply endorsement by the Naval Safety Center.

clearance. Then, as the helo came closer, I couldn't see enough clearance and gave him a thumbs DOWN. He kept coming. Next, I made fists and crossed my arms. The pilot looked right at me and kept rolling. Then, I ran like hell.

He made it into the wrong spot, the wrong way. How? I'll never know.

After he shut down and all hands had walked away without any chocks or tiedowns, I climbed into my helo and told my friends what had happened. We were all shook. We released the rotor brake and positioned our No. 2 blade as close as possible to one of the H-46 blades. We had exactly 11½ inches separation. We didn't measure the distance between his blade and the H-53, but it looked just as close.

We buttoned up our bird and the next day went aboard USS Flattop on the way to Yankee Station without any further thoughts about the possible tragedy. I just happened to think of it tonight after reading the latest copy of APPROACH. I have greatly enjoyed APPROACH while in the Navy.

Ed Herdt
HC-2 Det 66

● The action you witnessed and tried to prevent can be explained. It begins with NO supervision, NO safety smarts on the part of the director, NO common sense by the pilot, and NOT enough linemen to do the job! Notice all the negatives? It's too bad we have so few crusty Bo'suns and Gunnies around nowadays. You didn't say in your letter, but we'll bet there were 10,000 square yards of concrete that could have been used for the H-46 instead of the spot it was crammed into.

Briefing Tips

NAS, Norfolk - Recently, I accompanied a safety survey team on a visit to various training command bases. Our orders directed government air in the name of fiscal austerity.

During the 10-day trip, on 3 separate legs in Navy heavy transport aircraft, there was no passenger briefing given. Two of the three legs were flown in the same aircraft and by the same crew. On one leg, our baggage was placed between the back of the passenger seats and the aircraft bulkhead and wasn't secured with cargo straps.

It's bad enough to see transport crews violate General NATOPS, but to do it with a safety survey team aboard seems well beyond the realm of common

sense.

Disgusted Surveymouse

● The time to *squeak up* was right then and there - on the spot, and we hope you did. It has been our experience that a few transport crews have the mistaken belief that a load of seasoned Navy passengers do not need a briefing.

A load of passengers, regardless of their rank, experience, and reason for being aboard, should be briefed every time. Granted, it may not be necessary to conduct a full briefing in every case, but who is to say what part of the briefing shall be omitted?

To FOD or Not to FOD

NAS, Jacksonville - This squadron is bound and determined to seriously impair the hearing of all E-5s and below. A FOD walkdown is held 5 days a week, which is well and good, but it always seems that at least one P-3 is being preflighted at this time, with aircraft APU running. This is very injurious to personnel involved in the walkdown. Apparently, our squadron does not have the funds to supply all hands with ear plugs or "Mickey Mouse" ears. I have personally dropped "Anymouse" complaints in the squadron safety suggestion box, but nothing has been done to solve this problem.

Correction: No preflight is to commence until after FOD walkdown. If a preflight is absolutely required at this time, reschedule or cancel FOD walkdown.

Hard of Hearingmouse

● Your squadron ASO advises that personnel involved in the FOD walkdown (without ear protection) have repeatedly been directed to remain at least 50 feet from the APU. Inside this distance, there is a definite hazard to the unprotected ear. So, rather than dispense with such an invaluable aid to safety (FOD walkdown), let those with "mouse" ears and plugs do the picking up near the noise.

"It Pays To Wait"

NAS, North Island - No question that "It Pays To Wait" (October 1972 APPROACH) is worthy of reprint. The article should be required reading for those who place their posteriors in Martin-Baker products. The article reminded me of those who still aviate way up there without benefit of such

FLIP Changes

THE DEFENSE Mapping Agency, St. Louis, Missouri, has notified the Naval Safety Center of the following changes to FLIP documents:

● *Autovon numbers for special use airspace.* To facilitate the scheduling of special use airspace in the conterminous U.S. by aircraft other than those of the operating agency, the autovon numbers and office symbol of the operating agency will be added to Planning Section IIB, effective with the 29 March 1973 issue. Request all operating agencies forward their autovon numbers and office symbols to DMACC (ADD), South Annex, St. Louis AFS, Mo. 63125.

● *DOD restricted use of STARs.* Many STARs do not provide sufficient routing or altitude information to allow orderly completion of flight to destination airports in the event of communication failure. Therefore, use of STARs is restricted to DOD aircraft equipped with two functioning transceivers compatible with air traffic control.

"egress-expediters." Perhaps the following will make sober sense to current Navy birdmen:

Some dozen winters past, when the A-3 was the newest item in the inventory, my squadron transitioned from P-2s to the A3D-1. "Radical" is the single word which comes to mind in describing such a transition.

"Douglas forgot the props!" and "What's the plow under the tail for?" were overheard more than a few times!

Our squadron was fresh from a

deployment to Okinawa during which we seldom ascended beyond "Angels One." Thus, regarding bailouts, it was most appropriate that our troops were "as soon as clear of the bird, pop your chute" types. However, not long after the transition to A-3s, patrol type bailout training caused a fellow airman to fail his final test.

One of our crews had to part company with their A-3 at FL 200-plus over the Cascades in winter. One airman failed to "disremember" his previous years of training (pop your chute when clear). Result: he succumbed in the sub-freezing and rarified atmosphere while slowly descending beneath his chute. His crewmates successfully fought the impulse to pull the ripcord until they had free-fallen to comparatively warmer air.

While I am at a loss to describe a good way to buy the farm, it seems to this retired zoomie that there can be little consolation in hearing that a fellow birdman "punched out successfully but froze to death because he used the manual override and popped his parachute way above the freezing level."

A short sequel to "It Pays to Wait" may be in order, especially with winter again upon us. Such a sequel could read "Know your enroute AGL, know the OAT... Punch out high in the sky if you must, but get down into warmer ambient air ASAP on Messrs Martin-Baker's drogue, not your main." You will enjoy that hot toddy all the more knowing it does, indeed, "pay to wait."

R. O'D. Conway
NAVAIRSYSCOMREPAC

Cool-Headed Professionals

NAS, Norfolk — CDR Fink's article in the October issue evidenced his thoroughly professional approach to aviation. One sentence really caught my eye. "After the aircraft was preflighted, passengers briefed..." Most readers doubtless rushed on. My thoughts lingered over the last words. Often in the hustle and bustle of aviation, we slight the passenger briefing to make a launch time, block time, or IFR release. But to this day, I can recall in detail CDR Fink's brief.

I was scheduled to ride to Rota to pick up our ship's C-1A. It was to be my first flight in a "Hummer," so I paid particular attention to the brief. The plane commander covered ditching, bailout, escape routes, and all the equipment which we might be called upon to use. Bailout seemed a remote possibility. Indeed, I had often heard "Hummer" jocks disparage the parachutes as so much useless baggage. Many "Stoof" pilots had the same opinion until a few years ago when, after a midair, an S-2 crew hit the silk and survived.

I selected the after crew station (with an escape hatch overhead, it looked like the best spot). We strapped in and settled down for a routine flight. The cat shot was smooth, and the aircraft climbed into a clear, sunlit sky. From habit, I scanned the aircraft, noting the gear and flaps up and nacelle clean. As I glanced at the exhaust, it exploded in a ball of fire. The passenger brief suddenly assumed paramount importance.

I notified the pilots and described the extent of the damage I could see. I

reviewed in my mind the various emergency procedures. We were at 5000 feet. If we should lose all hydraulic pressure, which was likely with the loss of the starboard prop and gearbox, we would have precious few seconds in which to bail out. I was determined to be the first to successfully do so, if the need arose (since then, three E-2 crewmen have successfully bailed out).

The communications portion of our brief quickly paid off, enabling me to help the pilots re-establish UHF communications when they lost UHF control in the cockpit (there was extensive damage to wiring in the fuselage section behind the copilot).

Fortunately, neither bailout nor ditching was necessary. CDR Fink and his copilot, LTJG Duncan McDuff, brought us back to the sweetest trap I have ever experienced. They were cool-headed professionals from start to finish. They were prepared, and they had taken the time to prepare us.

LT James A. Metcalfe, USNR

● You're not the first to comment on CDR Fink's professional attitude, but you're certainly one of the most qualified thanks to this particular episode.

It's a great pleasure to publish articles which evidence such premeditated professionalism — especially those with happy endings.

Our thanks to you for recognizing CDR Fink's contribution toward that end and for sharing your personal experience from a passenger's point of view.

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NavAir 00-75-510

Purposes and policies: Approach, published monthly by the Naval Safety Center, presents the most accurate information currently available on the subject of aviation accident prevention. Contents should not be considered as regulations, orders, or directives and may not be construed as incriminating under Art. 31, UCMJ.

Photos: Official Navy or as credited. Non-naval activities are requested to contact NAVSAFECEN prior to reprinting APPROACH material.

Correspondence: Contributions are welcome. The right to make editorial changes to improve the material without altering the intended meaning is reserved. Reference to commercial products does not imply Navy endorsement. Views of guest-written articles are not necessarily those of NAVSAFECEN.

Distribution: Requests for distribution changes should be directed to NAVSAFECEN, NAS, Norfolk, Va. 23511. Phone: Area Code 703, 444-1321, Att: Safety Education Dept., IF YOU ARE A PAID SUBSCRIBER, address all renewals and address changes to Division of Public Documents, Washington, D. C. 20402.

Subscriptions: Single copy \$1.00; 1-year subscriptions \$10.50; \$2.75 additional annually for foreign mailing.

Printing: Issuance of this periodical approved in accordance with Department of the Navy Publications and Printing Regulations, NAVEXOS P-35. Library of Congress Catalog No. 57 60020.



Extra Effort: A CHALLENGE

THE SINGLE, biggest challenge to the safety officer is to convince management and supervision that it is truly to their advantage, without exception, to expend the extra effort necessary for a safe evolution. This is because he cannot define the value of safety in terms that contribute directly and measurably. Safety per se has no cash value; "accident free" is an indirect profit, however great it may be. Psychologists have defined the value of safety as derived from one or more of the following factors:

- Moral responsibility.
- Prestige of the organization.
- Economic advantages.
- Mission capability.

All of these are important. In the military environment, however, their value is often obscure when related to specific routine tasks. In naval aviation, safety assumes its greatest value when related to mission capability. In this light, safety may be sold on its real value; that is, assisting each individual in consistently accomplishing his objectives more effectively.

There simply are no tools or methods developed for management to exercise direct control over accidents. As commanding officers and supervisors, however, you do have control of specific risk elements inherent in every activity. The following analysis may be employed to logically and effectively apply risk control to these tasks.

- Risk analysis:

1. Identify every hazard possible for the situation.
2. Rank these hazards by severity.
3. Second, by probability of occurrence.

4. Third, by ability to either eliminate or control the hazard.

5. Combine these steps into a single order of management emphasis, i.e., where the most severe hazards, those which occur most frequently, can be reduced for the least expenditure of resources.

- Risk control: In the priority established above, take systematic action to accomplish the following to the greatest degree possible:

1. Eliminate the hazard.
2. Reduce or control remaining aspects of the hazard.
3. Establish some system of warning or caution of the hazard.
4. Indoctrinate and train all personnel concerned in methods to overcome the hazard.
5. Make recommendations to higher authority for further actions to accomplish these steps.

In many cases, risk control is as simple and straightforward as it is important. It may be simply eliminating procedures that are unnecessary or otherwise unsound to begin with. The following are examples of areas which should be carefully considered from a risk viewpoint:

- Hot-refueling/hot-seat turnaround.
- Cannibalization.
- Nav training routes through high-density traffic areas.

In addition to cost, manpower, and scheduling, risk must become the fourth basic consideration of every management decision in aviation.

Excerpted from a *COMMATWING ONE* msg.

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Something
for Everyone!



